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EXAMINER

CHIN, CHRISTOPHER L

ART UNIT

PAPER NUMBER

1641

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/044,920

Applicant(s)

PIASIO ET AL.

Examiner

Christopher L. Chin

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 1, 2, 19 and 20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 3-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-20 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election of Group II – claims 3-18 in the reply filed on 12/01/04 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claims 1-2 and 19-20 are withdrawn from consideration.

Claim Rejections - 35 USC § 112

2. Claims 3-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 3 is vague because it depends from non-elected claim 1. The limitations of claim 1 should be incorporated into claim 3. The claim is also not clear as to the function of the claimed method. The preamble of the claim does not set forth the function of the claimed method, i.e. detection of an analyte, determining an amount of analyte present, etc. The last step of the method suggests a method for separation of target biological ligands from an aqueous fluid and thus should be reflected in the preamble. In step (c), the recitation of "the gradient" lacks antecedent support.

Claim 4 is vague. In step (f), the recitation of "the magnetic intensity" lacks antecedent support. In step (g), the recitation of "in a known manner" is not clear as to what "known manner" is being referred to.

Claim 5 is vague. The steps in the claim should be "renumbered" since there are already steps (a)-(d) in the previous claims from which claim 5 depends. The recitation of "in a known manner" is not clear as to what "known manner" is being referred to. In step (b), the recitation of "the magnetic moment" lacks antecedent support. In step (d), the recitation of "the total magnetic moment" lacks antecedent support.

Claim 10 is vague. The recitation of "different" with respect to the biological binding partner is not clear as to what "different" entails. Its relationship to the target ligand and binding partner immobilized on the strip is not clear.

Claim 11 is vague because it depends from non-elected claim 2. The limitations of claims 1-2 should be incorporated into claim 11. In lines 1-2, one of the "are" should be deleted? The claim is also not clear as to the function of the claimed method. The preamble of the claim does not set forth the function of the claimed method, i.e. detection of an analyte, determining an amount of analyte present, etc. The last step of the method suggests a method for separation of target biological ligands from an aqueous fluid and thus should be reflected in the preamble. In step (c), the recitation of "the gradient" lacks antecedent support.

Claim 12 is vague. In step (f), the recitation of "the magnetic intensity" lacks antecedent support. In step (g), the recitation of "in a known manner" is not clear as to what "known manner" is being referred to.

Claim 13 is vague. The steps in the claim should be "renumbered" since there are already steps (a)-(d) in the previous claims from which claim 13 depends. The recitation of "in a known manner" is not clear as to what "known manner" is being

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referred to. In step (b), the recitation of "the magnetic moment" lacks antecedent support. In step (d), the recitation of "the total magnetic moment" lacks antecedent support.

Claim 18 is vague. The recitation of "different" with respect to the biological binding partner is not clear as to what "different" entails. Its relationship to the target ligand and binding partner immobilized on the strip is not clear.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claim 3 is rejected under 35 U.S.C. 102(b) as being anticipated by Miltenyi et al.

Miltenyi et al (US Patent 5,385,707) discloses apparatus, superparamagnetic particles, and methods for high gradient magnetic separations (HGMS). The apparatus for conducting HGMS comprises a high intensity permanent between the poles of which is disposed a chamber having an inlet means at the top of said chamber and an outlet means at the bottom of said chamber, wherein the outlet means includes a means for constricting the flow of fluid out of the chamber (col. 4, line 63, to col. 5, line 2). With regard to methods and materials for magnetic labeling of materials to be separated, polysaccharide coated superparamagnetic particles of colloidal size are provided,

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wherein the coating can be conjugated to moieties which confer on the particles specificity for binding to the target material whose isolation is desired (col. 5, lines 21-41). The superparamagnetic particles are collections of magnetic iron oxide crystals of 50-600 angstroms (5-60 nm) which are aggregated into particles of colloidal size, approximately 100-200 angstroms (10-20 nm) in diameter, preferably around 400-1000 angstroms (40-100 nm) in diameter (col. 7, lines 21-29). The iron oxide crystals are dispersed/coated in a polysaccharide material, such as dextran (i.e. a covering matrix of non-magnetic, non-metallic material that is compatible with but non-reactive with target biological ligands) (col. 7, lines 50-68). In conjugating the coated particles to a specific binding moiety which is directed to a target biological material, the polysaccharide or other coating is suitably derivatized to provide functional groups for conjugation to the specific binding moiety. The specific binding moiety can be antibodies (col. 8, line 62, to col. 9, line 27). Example 4 discloses a method for separation of murine T cells by HGMS. A sample containing mouse spleen cells is incubated with biotinylated anti-T-cell antibodies and avidin. Biotin-conjugated superparamagnetic particles are incubated with the sample. The particles bind through biotin to the avidin on the T-cells. The sample is then applied to the disclosed apparatus for high gradient magnetic separation of the T-cells labeled with the particles.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over

Rembaum in view of Miltenyi et al.

Rembaum (US Patent 4,267,234) disclose magnetic, high density or electron dense microspheres prepared by suspension polymerization of glutaraldehyde (i.e. a non-magnetic, non-metallic material) in the presence of a suspension of finely divided metal or metal oxide (col. 2, lines 47-51, and col. 10, lines 25-31). The microspheres can have a diameter between 200 angstroms (20 nm) to 10 microns (10,000 nm) (col. 10, lines 25-29). The metal is incorporated into the microsphere in an effective amount of from 0.5% to 20% by weight, generally from 1% to 10% by weight. The metal or metal compound particles are preferably fine, evenly sized materials having a uniform diameter smaller than the resultant microsphere diameter, typically below 1000 angstroms (100 nm), generally from 25 angstroms (2.5 nm) to 500 angstroms (50 nm). The metals are preferably the electron dense heavy metals having a high atomic number above 50, preferably above 75, such as Pb, Ni, Co, Pt, Au, or Fe. The metal may be magnetically attractable such as Fe, Ni, Co, or alloys thereof or an inorganic magnetic compound such as a metal oxide. The magnetic material is preferably a magnetic iron oxide (Fe_3O_4 – a superparamagnetic material) (col. 10, line 63, to col. 11, line 5). Example 14 discloses a procedure using Fe_3O_4 to form magnetic polyglutaraldehyde microspheres having an average diameter of 0.1 microns (100 nm).

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Example 26 discloses conjugating human IgG to magnetic polyglutaraldehyde microspheres. Example 27 discloses a method for labeling and separating human lymphocytes (rbc). Magnetic polyglutaraldehyde microspheres (200 nm in diameter) are conjugated with FITC tagged human IgG. Mixtures of human rbc are contacted with the magnetic microspheres to label the rbc and gently stirred in a glass vial fitted with a horseshoe magnet. At the end of two hours, cells which were not attracted to the vessel walls were isolated. Cells attracted by the magnet were diluted with PBS and the magnetic separation was repeated.

The method in Rembaum differs from the instant invention in failing to teach using a gradient of a magnetic field.

Miltenyi et al (US Patent 5,385,707) teaches using a high gradient magnetic field to separate biological material labeled with superparamagnetic particles (composed of iron oxide) from a liquid (col. 4, lines 20-68; col. 5, lines 1-50; and col. 7, lines 21-30).

It would have been obvious to one of ordinary skill in the art to substitute a high gradient magnetic field, as taught by Miltenyi et al, for the horseshoe magnet in the method of Rembaum for separation of the superparamagnetic particles because Miltenyi et al show that a high gradient magnetic field can be used as an alternative means for separation of iron oxide superparamagnetic particles, such as those used in the method of Rembaum, from a liquid.

7. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miltenyi et al in view of Liberti et al.

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See above for the teachings of Miltenyi et al.

Miltenyi et al differs from the instant invention in failing to teach using bovine serum albumin instead of dextran as the material for the covering matrix of the superparamagnetic particles.

Liberti et al (US Patent 6,120,856) disclose superparamagnetic particles composed of metal oxides, such as iron oxide, dispersed in bovine serum albumin or dextran. The particles are salt stable and can be separated and resuspended repeatedly (cols. 7-8 and Example 12). A specific binding material, such as avidin (Example 6) or an antibody (Example 11), can be coupled to the particles.

It would have been obvious to one of ordinary skill in the art to use bovine serum albumin, as taught by Liberti et al, instead of dextran as the covering matrix material of the superparamagnetic particles of Milenyi et al because Liberti et al teach that dextran and bovine serum albumin are functionally equivalent materials. Also use of bovine serum albumin provides particles that are more salt stable and particles that can be separated and resuspended repeatedly.

Allowable Subject Matter

8. Claims 4-10 and 12-18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and overcame the above rejections under 35 USC 112 second paragraph.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US Patent 6,607,922 and its PGPub document US 2003/0040124 disclose a test strip that utilizes superparamagnetic particles to label target analytes. However, both references require the superparamagnetic particles be placed in a reagent pad of the test strip. The particles are not contacted with the sample, separated from the sample by a gradient of a magnetic field, resuspended, and then applied to the test strip.

The following US Patents disclose superparamagnetic particles and methods for using them:


4,230,685; 4,297,337; 4,452,773; 4,554,088; 4,628,037; 4,672,040; 4,795,698; 4,965,007; 5,492,814; 5,512,332; 5,597,531; and 5,916,539.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher L. Chin whose telephone number is (571) 272-0815. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on (571) 272-0823. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Christopher L. Chin
Primary Examiner
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2/14/05